

IN THE CLAIMS:

1. (Currently Amended) A coin separating unit comprising:
 - a coin transporting unit including a rotatable belt for receiving coins of different size on a support surface of the rotatable belt that translates the coins linearly for subsequent processing, the support surface having a predetermined flexibility and friction characteristic to engage the coins for linear translation and to enable coin movement transverse to a direction of movement where the coin transporting unit provides forward drive of the coins;
 - a separating roller unit positioned above the support surface at a distance no greater than twice the thickness of the coins to be separated, the surface of the separating roller unit closest to the support surface moving in a direction opposite to the movement of the support surface; and
 - a supporter roller unit mounted on a pivotable lever is operatively located upstream of the separating roller unit, rotates freely around the rotating shaft, contacts the first rotatable belt, moves away from the first rotatable belt when the coin contacts the supporter roller unit, the separating roller unit and the supporter roller unit rotate about parallel axes extending above and across the rotatable belt, the supporter roller unit is only driven by contact with the rotatable belt or passing coin.
 - a supporter unit includes a roller member mounted on a pivotable lever operatively located upstream of the separating roller unit, relative to movement of the support surface and adjacent the separating roller unit, and rotates freely around the rotating shaft, the supporter unit is movably located above the support surface by a distance which approximates the thickness of the coins to be separated wherein the supporter unit can move transverse to the

support surface when engaging a coin and can assist in preventing more than one coin from passing beneath it before the coin engages the separating roller unit and the flexibility of the support surface accommodates relative movement of a coin to assist in preventing coin jams, the 25 separating roller unit and the roller member rotates about parallel axes extending across the support surface whereby the separating roller unit and the roller member when contacting a coin in translation, forces the support surface away from the separating roller unit when passing the coin beneath the separating roller unit.

2. (Previously Presented) The coin separating unit of Claim 1 wherein the separating roller unit is rigidly fixed above the support surface.

3. (Original) The coin separating unit of Claim 1 further including a coin drawing auxiliary unit is located downstream of the separating roller unit.

4. (Original) The coin separating unit of Claim 1 wherein the separating roller unit rotates so that its surface closest to the support surface is moving opposite to the translation direction of the support surface.

5. (Cancelled)

6. (Previously Presented) The coin separating unit of Claim 1 wherein the supporter unit is biased by a predetermined force towards the support surface.

7. (Original) The coin separating unit of Claim 6 wherein the supporter unit is biased by a spring member.

8. (Original) The coin separating unit of Claim 1 further including a second coin transporting unit for receiving a coin from the first coin transporting unit and translating the coin at a faster speed than the first coin translating unit.

9. (Currently Amended) In a coin separating assembly for separating coins of different sizes, the improvement comprising:

a coin hopper for receiving various coins of different sizes in bulk;

5 a rotating belt positioned under the coin hopper for receiving coins from the coin hopper by a gravity feed, the rotating belt has a coplanar pivoting support member with an elongated surface for supporting an underside of the rotating belt between the rotating belt pulleys having trailing and leading edges to reduce interference; and

10 a separating roller unit positioned above the rotating belt at a distance no greater than twice the thickness of the coins to be separated, the surface of the separating roller unit closest to the rotating belt moving in a direction opposite to the movement of the support surface,

wherein the rotating belt has a predetermined flexibility to enable a coin to be pushed by the separating roller unit into the rotating belt and the pivoting support member ~~can accommodate~~ accommodates the coin movement transverse to the directional movement of the belt by tilting the elongated surface on an underside of the rotating belt; and

15 a supporter roller unit mounted on a pivotable lever is operatively located upstream of the separating roller unit, rotates freely around the rotating shaft, contacts the first rotatable belt, moves away from the first rotatable belt when the coin contacts the supporter roller unit, the separating roller unit and the supporter roller unit rotate about parallel axes

extending above and across the rotatable belt, the supporter roller unit is only driven by contact
20 with the rotatable belt or passing coin.

10. (Currently Amended) In a coin separating assembly for separating coins of different sizes, the improvement comprising:

a coin transporting unit including a rotating belt for translating coins along a direction of movement having a predetermined flexibility to permit displacement of a coin being
5 translated in a transverse direction;

a separating roller unit having a plurality of separating rollers rotably mounted at a fixed distance above a coin supporting surface of the rotating belt; and

a supporter roller unit mounted on a pivotable lever is operatively located upstream of the separating roller unit, rotates freely around the rotating shaft, contacts the first
10 rotatable belt, moves away from the first rotatable belt when the coin contacts the supporter
roller unit, the separating roller unit and the supporter roller unit rotate about parallel axes
extending above and across the rotatable belt, the supporter roller unit is only driven by contact
with the rotatable belt or passing coin.

~~a supporter roller unit, operatively located upstream of the separating roller unit~~
15 ~~and adjacent the separating roller unit, including at least one supporter roller rotably mounted to contact any overlaying coins and assist in permitting any underlaying coin to pass to the separating roller unit while displacing the overlaying coin, wherein the coins can pass beneath the separating roller unit and the rotating belt can flex to increase the distance beneath the separating roller unit as the coin passes underneath, the separating roller unit and the supporter~~
20 ~~roller unit rotate about parallel axes extending above and across the rotating belt.~~

11. (Currently Amended) A coin separating unit comprised of:

a coin transporting unit including a first flexible rotatable belt and a second rotatable belt where plural coins are transported linearly towards a storing direction by the rotatable belt;

5 a separating roller which is located above the first rotatable belt at a distance which is, at most, two times a thinness of the thinnest coin of the plural coins or less, when the first rotatable belt moves in the storing direction, the separating roller is fixed on a rotating shaft, a peripheral surface of the rotatable belt moves in the opposite direction to the storing direction, underneath the separating roller;

10 a supporter roller unit which is located upstream from the separating roller and is located above the rotatable belt at a distance which is, at most, the thinness of the thinnest coin or less, and it moves mounted on a pivotable lever is operatively located upstream of the separating roller, rotates freely around the rotating shaft, contacts with the first rotatable belt, moves away from the first rotatable belt when the coin contacts the supporter roller unit, the separating roller and the supporter roller unit rotate about parallel axes extending above and across the rotatable belt, the supporter roller is only driven by contact with the rotatable belt or passing coin;

15 a first drawing auxiliary roller mounted on a pivotable lever is operatively located downstream of the separating roller and is rotated freely around the rotating shaft, and contacts the first rotatable belt; and

20 a second drawing auxiliary roller mounted on the pivotable lever, contacting the second rotatable belt.

12. (Currently Amended) The coin separating unit as claimed in claim 11:
the first flexible rotatable belt [[can]] resiliently [[bend]] bends downward at the position of the separating roller, which is fixed at a predetermined position above the rotatable belt when a coin passes beneath the separating roller.
13. (Cancelled)
14. (Currently Amended) The coin separating unit as claimed in claim 11:
the supporting supporter roller [[unit]] is rotatable on a lever, which is pivotable and is coaxially mounted to the separating roller, also the supporting supporter roller is urged to the coin transporting unit by a predetermined force.
15. (Currently Amended) The coin separating unit as claimed in claim 11:
the supporting supporter roller [[unit]] has contact with the first flexible rotatable belt and is rotated by the first flexible rotatable belt.
16. (Currently Amended) The coin separating unit as claimed in claim 11:
further including a coin drawing auxiliary unit located downstream of the separating roller [[unit]].
17. (Previously Presented) The coin separating unit as claimed in claim 11, the separating roller rotates in an opposed movement to the coin transporting unit.
18. (Currently Amended) The coin separating unit as claimed in claim 11:
the second drawing auxiliary [[unit]] roller is located downstream of the coin transporting unit and a ~~second coin transporting unit~~ the second rotatable belt beneath the second

drawing auxiliary [[unit]] roller moves faster than the ~~coin transporting unit~~ first flexible
5 rotatable belt.

19. (Currently Amended) The coin separating unit as claimed in claim 18:

the first drawing auxiliary ~~unit~~ is a roller which is located downstream of the separating roller and has a distance between the first drawing auxiliary roller and the first rotatable belt which is, at most, thinner than the thinnest coin and is located [[away]] upstream 5 from the second ~~coin transporting unit~~ rotatable belt.

20. (Currently Amended) The coin separating unit as claimed in claim 11:

the distance between the separating roller and the ~~coin transporting unit~~ first rotatable belt is less than two times the thickness of the thinnest coin and larger than the thickness of the thickest coin of the plural coins.

21. (Currently Amended) The coin separating unit as claimed in claim 11:

the supporter roller [[unit]] rotates in an opposite direction to the movement of the coin transporting unit when moving a coin towards the storing direction.

22. (Currently Amended) The coin separating unit as claimed in Claim 1 wherein a coplanar support member with trailing and leading edges configured to reduce interference is mounted for relative movement adjacent and underneath the coin transporting unit to limit the extent of transverse coin movement beneath the separating roller unit.

23. (Currently amended) The coin separating unit as claimed in Claim 11 wherein a coplanar support member with trailing and leading edges configured to reduce interference is mounted for relative movement adjacent and underneath the rotatable first flexible belt to limit

the extent of transverse coin movement against the first flexible belt beneath the separating roller
5 unit.

24. (Currently Amended) The coin separating unit as claimed in Claim 11 wherein
the first rotatable flexible rotatable belt is formed with a urethane rubber surface and a polyamide
core.

25. (Previously Presented) The coin separating unit as claimed in Claim 11 wherein a
one way clutch member provides rotation to the separating roller.

26. (Currently Amended) The coin separating unit as claimed in Claim 11 wherein a
diameter of the separating roller is twice a diameter of supporter roller [[unit]].

27. (Currently Amended) A coin separating unit comprised of:
a coin transporting unit including a rotating belt mounted on a pair of rollers for
translating coins along a linear direction of movement, the rotating belt has a predetermined
flexibility to permit displacement of a coin being translated in a traverse direction to the direction
5 of movement wherein plural coins on the rotating belt are transported towards a storing direction;
a separating roller unit is rigidly fixed above a surface of the rotating belt at a
distance which is at most two times a thinness of a thinnest coin or less, the rotating belt moves
in the storing direction, a peripheral surface of the separating roller unit is driven in an opposite
direction to the storing direction, the rotating belt bends elastically relative to the separating
10 roller for increasing coin passage distances between the surface of the rotating belt and the
peripheral surface of the separating roller unit;

a supporter roller unit mounted on a pivotable lever is operatively located upstream of the separating roller unit, rotates freely around the rotating shaft, contacts the first rotatable belt, moves away from the first rotatable belt when the coin contacts the supporter
15 roller unit, the separating roller unit and the supporter roller unit rotate about parallel axes extending above and across the rotatable belt, the supporter roller unit is only driven by contact with the rotatable belt or passing coin;

~~a supporting roller unit is located upstream from the separating roller unit above the rotating belt and adjacent the peripheral surface of the separating roller unit to control coins and is rotatable on a first lever which is pivotable and coaxially to the separating roller unit, the supporting roller unit is urged toward the rotating belt by gravity, the separating roller unit and the supporting roller unit rotate about parallel axes extending above the rotating belt; and~~

a first drawing roller [[unit]] is located downstream from the separating roller unit and is located above the rotating belt to contact coins, the first drawing roller [[unit]] is adjacent the peripheral surface of the separating roller unit and is rotatable on a second lever which is pivotable and coaxially to the separating roller unit, the supporting supporter roller unit is urged toward the rotating belt by gravity, to have contact with the rotating belt, [:]]

wherein the supporting supporter roller unit is positioned to contact a coin on the rotating belt, and press the coin into the rotating belt by gravity, the pressed coin is nipped by the rotating belt and the separating roller unit, and the rotating belt is elastically bent by the coin, as the nipped coin passes through the distance between the rotating belt and the separating roller unit, the nipped coin is then pressed into the rotating belt by the first drawing roller [[unit]] and is drawn by the first drawing roller and the rotating belt, thereafter the drawn coin is transported toward a second coin transporting unit by the first drawing roller unit and the rotating belt.

28. (Currently Amended) The coin separating unit of claim 27 wherein the second coin transporting unit for receiving a coin from the rotating belt includes a second belt which is driven at a faster speed than the rotating belt, and a second drawing auxiliary roller [[unit]] is attached to [[a]] the second lever downstream from the first drawing roller [[unit]], and the 5 second drawing auxiliary roller ~~unit can contact~~ contacts with the second belt by gravity.

REMARKS

The present system is a linear coin translation design for improving a separation of coins being transported on a belt and minimizing maintenance of the coin singulating and translating components. Previously, problems have occurred when a plurality of different coins are fed in a bulk condition for transporting by a coin transporting unit, for example of a rotatable belt configuration, where different size coins from relatively small coins to thicker coins can be placed on the same transporting surface.

The present invention solves the problem of jamming by incorporating a supporter unit including roller members and a coplanar pivoting support member. The supporter unit 22 prevents jamming by eliminating some stacking of coins before the separating roller 20. (¶¶ 0037-0042, Figs. 3-10) The pivoting support member 72 underneath the transporting surface of belt 30 allows for controlled deflection of the belt in the event that stacked or jammed coins pass the supporter unit rollers 68 and 70 and are caught under the separating rollers 47 and 49. (¶¶ 0048-0049, Fig. 3) Supporter unit 22 may be used alone or in combination with the coplanar pivoting support member 72. (¶¶ 0042-0049, Claims 1 and 9) The cited prior art does not contain either of these features.

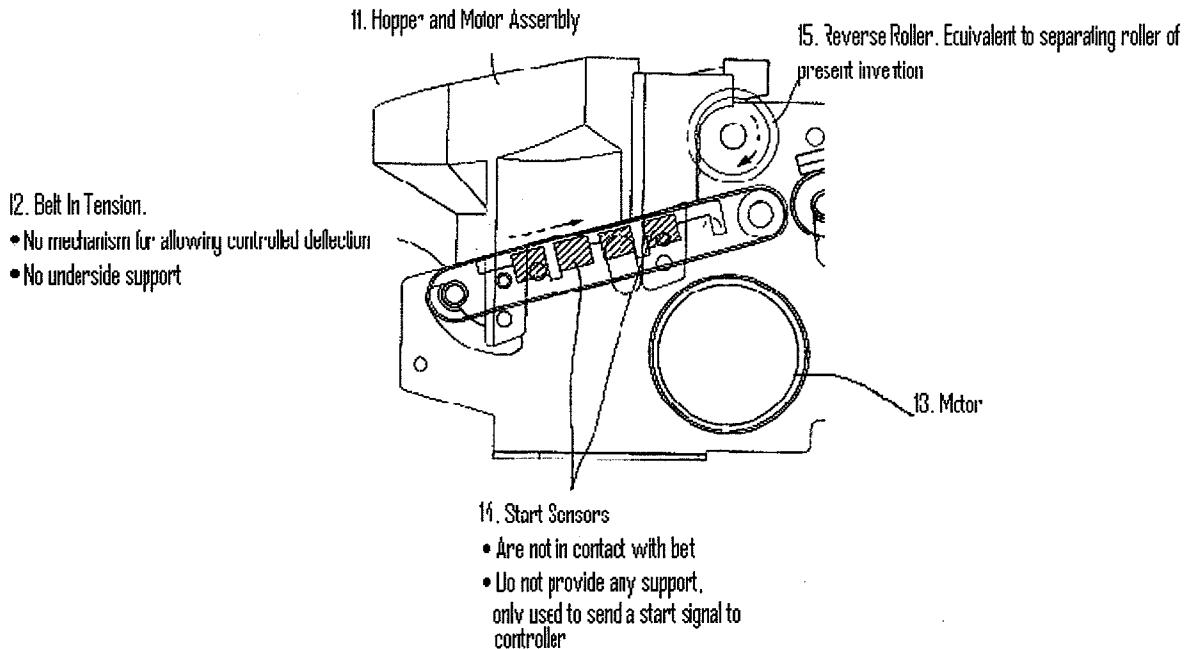
The Office Action rejected Claims 18 and 19 under 35 U.S.C. §112 as being indefinite. Claim 18 was rejected for a lack of antecedent basis for “the drawing auxiliary unit . . .” Claim 19 was rejected for being unclear in its use of “the distance . . .” Claims 18 and 19 have been amended to overcome the objection. Applicant respectfully requests that the rejections be withdrawn.

The Office Action rejected Claims 1, 2, 4, 7, 10-12, 14, 15, 17, 20, 21, and 26 as being unpatentable under 35 U.S.C. §103 in light of *Furukawa* (U.S. Patent No. 6,086,472) in view of *Stoltz* (U.S. Patent No. 6,059,650).

Furukawa discloses a coin translating and separating unit with two linear belt translating surfaces 12 and 16. *Furukawa* has a series of sensors 14 which send a signal to start drive motors 13 and 17 for belts 12 and 16 respectively. As the coins are translated on belt 12, reverse roller 15 unstacks and singulates the coins. (Col. 2, Ins. 2-45) The singulated coins travel on belt 16 where sensors 18 determine the properties of coins. (Col. 2, ln. 47 – Col. 3, ln. 17) If a counterfeit or otherwise undesirable coin is detected by sensors 18, a slender selection roller 21 is moved out of the way by a solenoid 24 and sending roller 25 acts as a stop body which directs it to a rejection board 26. Sensors 27 detects genuine coins passing and sensors 29 detect counterfeit coins passing. (Col. 2, ln. 65 – Col. 3, ln. 55)

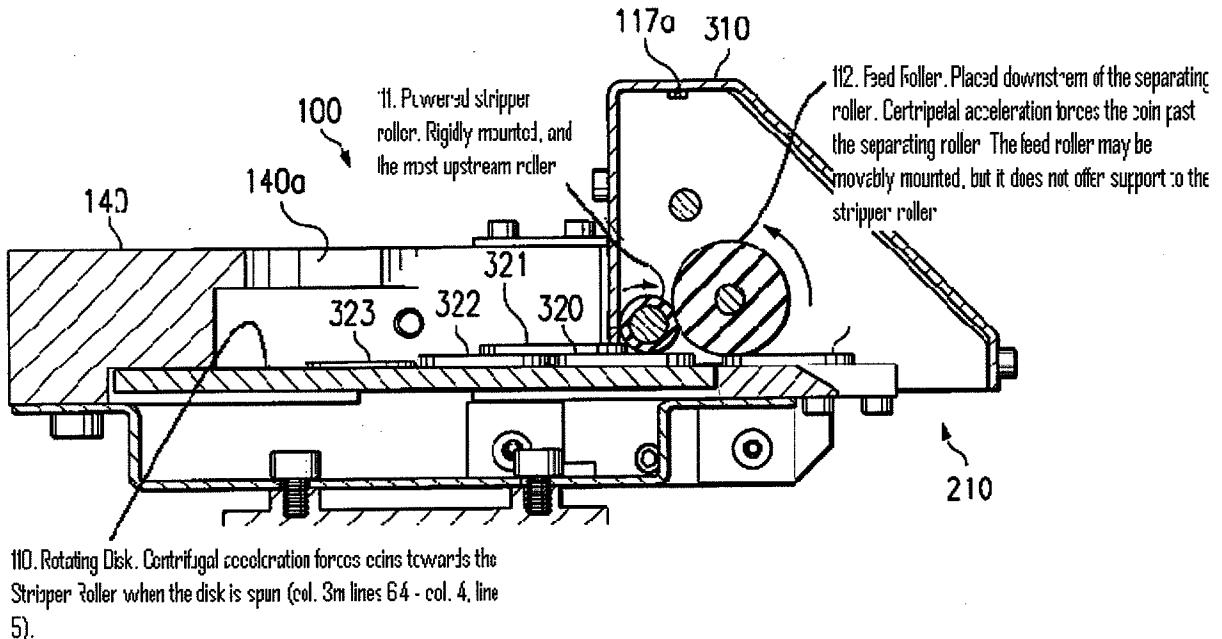
The Office Action acknowledges that *Furukawa* does not have the supporter unit 22 of the present invention. Furthermore, as seen in the reproduced portion of Figure 3 reproduced below, the spatial relationship between sensors 14 and belt 12 prevents “coin movement transverse to a direction of movement” to any significant degree. If belt 12 were to deflect to accommodate stacked coins, it would contact the sensors 14 and cause damage or malfunction.

Cited Portion of Fig. 3 in the *Furukawa* reference as basis of rejection follows:



The *Stoltz* reference optimizes the coin handling ability of a disk type singulator as used on a bus. *Stoltz* has a central disk 110 upon which coins 320 - 323 are placed. The disk 110 spins and centrifugal acceleration drives the coins 320 - 323 radially outwards towards a frame 140. (Col. 4, Ins. 1-10) The coins 320 - 323 then travel in the direction of the disk 110's rotation until they arrive at the singulation mechanism 100. (Col. 4, Ins. 11-20) Depending on initial placement and contact with other coins, some coins may arrive at the singulation mechanism 100 directly without contacting the frame 140. *Stoltz* employs a rotating feed roller 112 to advance coins to subsequent stages of sorting in place of a linearly translating surface of the present invention. (Col. 4, Ins. 21-37) As reproduced below, Figure 4 of the *Stoltz* reference shows only two rollers, stripper roller 111, which serves a separating or stripping function and feed roller 112, which serves a translating function. (Col. 4, Ins. 36-37 and Col. 5, Ins. 15-17).

Relevant portion of Fig. 4 from the *Stoltz* reference follows:



Stoltz does not teach “a supporter roller unit mounted on a pivotable lever which is operatively located upstream of the separating roller . . .” and is only “driven by contact with the rotatable belt or passing coin . . .” of Independent Claims 1, 9, 10, 11 or 27 as there are no rollers upstream of the stripper roller 111 in *Stoltz*. In addition to being downstream of the stripper roller 111, feed roller 112 cannot be considered a supporter roller member 68 or 70 of the present invention because it is driven by surface contact to the stripper roller 111 and not by “contact with the rotatable belt or passing coin . . .” (Col. 6, Ins. 18-20)

The Office Action rejected Claims 9, 22, and 23 under 35 U.S.C. §103 as being unpatentable over *Furukawa* in view of *Stoltz* and *DeVries et al.* (U.S. Pub 2004/0134757 A1).

The Office Action cites to *DeVries* for teaching a pivoting support member with an elongated surface for supporting an underside of the rotating belt purportedly for the “purpose of keeping the conveyor belts free of debris.” Claim 9 of the present invent contains a “a coplanar pivoting support member with an elongated surface for supporting an underside of the rotating

belt between the rotating belt pulleys having trailing and leading edges which reduce interference...”

DeVries is a scraper blade 14 assembly for cleaning the belt surface 12a of belt 12 and not an elongated support member 72 of the present invention. (Abstract) *DeVries* teaches a scraper system which is mounted in a manner that allows the scraper to maintain contact with the functional surface of the rotatable belt and remove debris which has accumulated during operation. (¶ 0009-0015) All the embodiments are targeted towards keeping the belt clear of debris, including the multi-component structures presented in Figures 1-6 and 13-16. Figure 12 from the *DeVries* reference reproduced below, demonstrates the cleaning system. In Figure 12, the belt 12 moves from left to right and scraper blade 14 cleans the transporting surface of the belt after it has unloaded any cargo. Scraper blade 14 deflects from belt 12 if a large piece of debris or a fastener is present. (¶ 0011-0017, 0040, 0048, and 0060)

The adjacent Figures depict the scraper system of Figure 12 installed on a conveyor system.

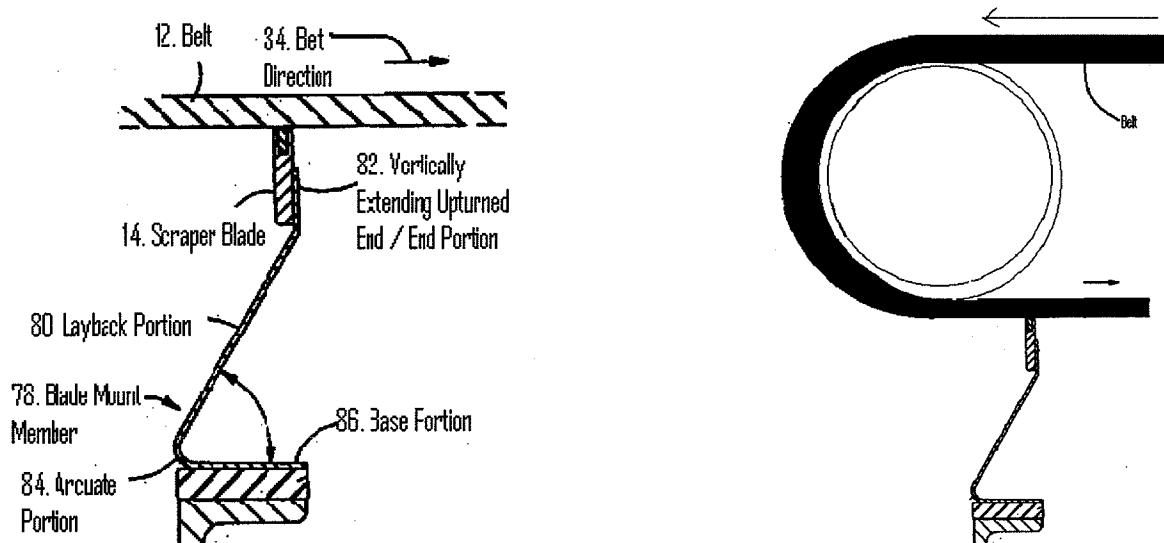


Fig. 12 from the *DeVries et al.* reference.

DeVries as installed on conveyor

By comparison, the coplanar elongated pivoting support member 72 of the present invention supports and maintains a predetermined operative belt position for passage of coins of different thicknesses and allows for only a predetermined deflection to accommodate forces resulting from stacked or non standard coins passing the supporter unit 22 and separating roller 20. Coplanar elongated pivoting support member 72 of the present invention does not serve to clean a functional surface of belt 30 as it is located between the pulleys 26 and 28, and does not contact the functional surface at any point. (¶¶ 0048-0049, Claim 9, Fig. 1)

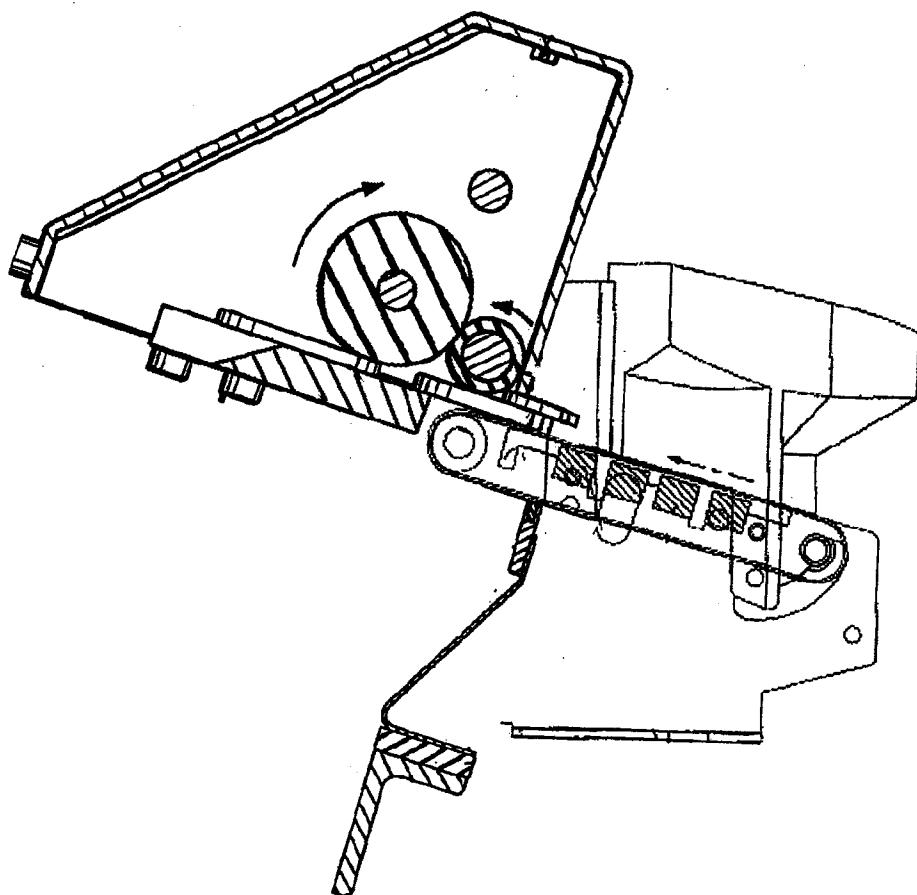
Furthermore, the *Furukawa*, *Stoltz*, and *DeVries* references should not be combined. If combined as the Office Action suggests, and the *DeVries* scraper blade is employed to provide support for the belt, the resulting pressures and temperatures on scraper blade 14 and belt 12 would result in premature belt 12 failure and require frequent blade 14 replacement.

“A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference or would be led in a direction divergent from the path that was taken by the applicant.”
In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994); see *KSR*, 127 S. Ct. at 1739-1740.

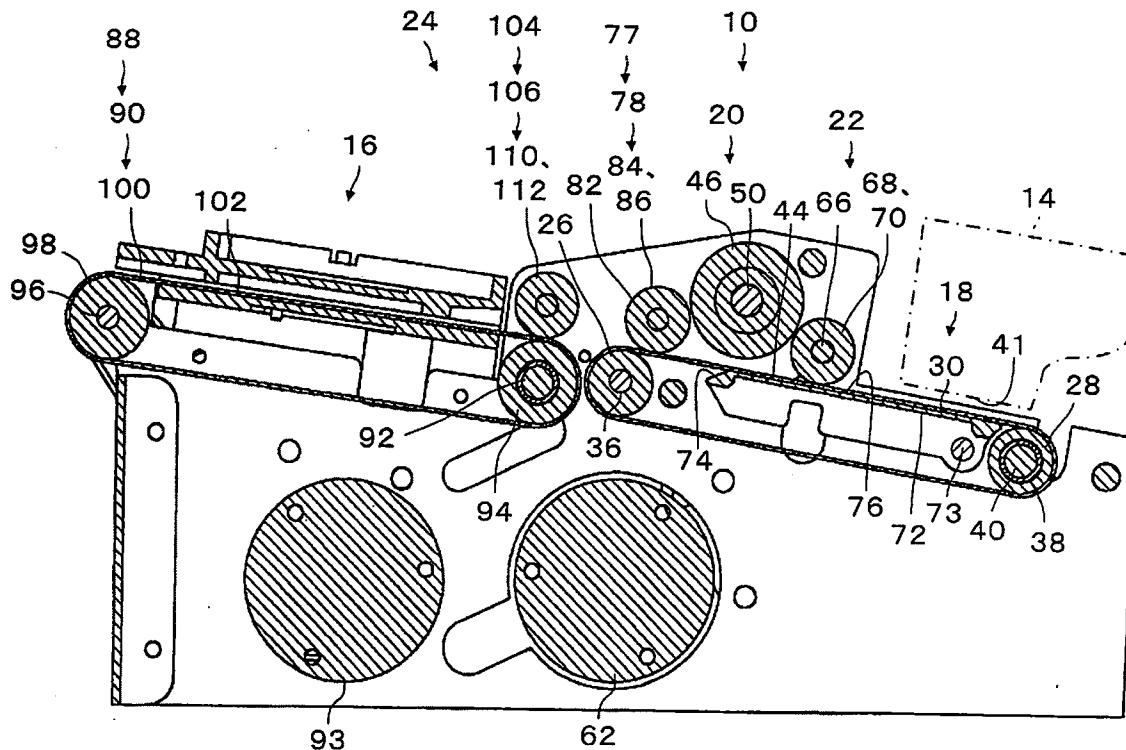
Accordingly, *DeVries* teaches away from the combination suggested in the Office Action. *DeVries* notes that the blade 14 impact on splice fasteners with high force should be avoided as it damages the fasteners and belt 12 itself. (¶ 0009) The *DeVries* invention allows blade 14 to accommodate deflection in belt 12 and not support belt 12, completely unlike the support member 72 of the present invention. (¶¶ 0008- 0015 and 0048)

Even if the *Furukawa*, *Stoltz*, and *DeVries* inventions were combined, however improperly, the hypothetical combination would still not have the features of the present invention.

The following Figures show a hypothetical combination of the prior art references and the present invention. A comparison of the two Figures will reveal that the supporter unit including supporter roller members 68 and 70 and coplanar pivoting support member 72 of our invention have no equivalents in the cited prior art.



Hypothetical combination of *Furukawa, Stoltz, and DeVries et al.*



Excerpt of Fig.1 of the present invention.

Applicant respectfully submits the present claim elements as defined in Independent Claims 1, 9, 10, 11, and 27 cannot be found alone or in any combination of the cited references, nor do the respective functions and purposes of the teaching of these references support any hypothetical combination to render obvious our claims.

The Office Action rejected Claim 8 under 35 U.S.C. §103 as being unpatentable over *Furukawa* in view of *Stoltz*.

The Office Action cited *Furukawa* for teaching a second transporting unit translating the coin at a faster speed than the first. However, Claim 8 is now believed valid as it is dependent on Claim 1. The combination of *Furukawa* and *Stoltz* did not render Claim 1 obvious and do not render Claim 8 obvious.

The Office Action rejected Claims 3, 16, 18 and 19 under 35 U.S.C. §103 as being unpatentable over a combination of *Furukawa* in view of *Stoltz* and *Shirasawa* (U.S. Patent No. 5,355,988).

While *Shirasawa* has a form of coin drawing auxiliary unit, it does not solve the deficiencies of the *Furukawa* and *Stoltz* references in rendering the dependent Claims 3, 16, 18 and 19 obvious.

The Office Action rejected Claim 24 under 35 U.S.C. §103 as being unpatentable over a combination of *Furukawa* in view of *Stoltz* and *Takahashi* (U.S. Pat. No. 5,595,284).

The Office Action cites *Takahashi* for disclosing a urethane rubber surface with a polyamide core for the purpose of making the belt stronger. However, the *Takahashi* reference does not solve the deficiencies of the *Furukawa* and *Stoltz* references and Claim 24 is believed acceptable in its present form.

The Office Action rejected Claim 25 under 35 U.S.C. §103 as being unpatentable over *Furukawa* in view of *Stoltz* and *Yano* (U.S. Pat. No. 6,467,767).

The Office Action cites *Yano* as having a one way clutch providing rotation to the separating roller. However, *Yano* does not solve the deficiencies of the *Furukawa* and *Stoltz* references. Further, as *Yano* is directed to a collator for flexible sheets of paper of essentially a uniform thickness, it would not be obvious for person of ordinary skill in the art of coin sorting, particularly for coins of different thicknesses to consider the *Yano* reference.

It is believed that dependent claims 2, 3, 4, 6-8, 12, 14-26, and 28 are allowable by further defining the scope of Independent Claims 1, 9, 10, 11, and 27. None of the reference cited teach the supporter roller unit or a pivoting support member including rollers of the present invention.